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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/021,988	12/13/2001	James M. Florence	SLA0354	7651
7590	03/23/2005		EXAMINER LAVARIAS, ARNEL C	
David Ripma Sharp Laboratories of America, Inc. 5750 N.W. Pacific Rim Blvd. Camas, WA 98607			ART UNIT 2872	PAPER NUMBER

DATE MAILED: 03/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/021,988

Applicant(s)

FLORENCE, JAMES M.

Examiner

Arnel C. Lavarias

Art Unit

2872



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/20/04 has been entered.

Response to Amendment

2. The cancellation of Claims 1-21 in the submission dated 12/20/04 is acknowledged and accepted. In view of this amendment, the rejections of Claims 10-16 under 35 U.S.C. 112, 1st paragraph, in Section 7 of the Office Action dated 8/26/04 are respectfully withdrawn.
3. The addition of Claims 22-40 in the submission dated 12/20/04 is acknowledged and accepted.

Response to Arguments

4. In view of the amendments made above, the rejections of Claims 1-21 in Sections 9-12 of the Office Action dated 8/26/04 are respectfully withdrawn.
5. Claims 22-40 are now rejected as follows.

Drawings

6. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitation ‘the adhesive thickness is less than the wire grid height’ (See Claim 37) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

7. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 25 recites the limitation "a volume defined by the product of the adhesive thickness and the air gap cavity area" in lines 2-3. Given the optical configuration of the assembly shown in Figures 1-3, the air gap (See 40 in Figure 3 of Applicant's disclosure) confined by the peripheral adhesive and the prism walls (See 36 in Figures 2-3) would necessarily have some particular volume of air. However, the specification of the disclosure does not specifically set forth the particulars required to determine the appropriate value for the volume, given the assembly configuration disclosed in Figures 1-3. The Examiner additionally notes that the product of adhesive thickness and the air gap cavity area may not result in an exact value for volume, since the thickness of the air gap varies as a function of location due to the heights of the wire grid elements encroaching into the air gap cavity, whereas the adhesive thickness is a fixed value (See in particular 54, 56, 28 in Figure 3 of Applicant's disclosure). Claims 26-29 are dependent on Claim 25, and hence inherit the deficiencies of Claim 25.

Claim Objections

8. Claims 28 and 38 are objected to because of the following informalities:

Both Claims 28 and 38 recite the limitation that the adhesive thickness is in the range of 1 to 30 microns. The specification of the disclosure appears to provide adequate support

for this limitation in that the specification (See in particular Page 7, lines 1-3; 36, 54 of Figure 3) discloses that the spacers may have a diameter that is in the range of 1 to 30 microns, and more preferably 10 microns, and that the diameter of the spacers and the thickness of the adhesive will generally be the same. However, the thickness of the adhesive is highly dependent on what position on the assembly the thickness is measured from. Since various size spacers are disclosed as being usable in the adhesive, with the air gap cavity being defined as the diameter of the largest size spacer used (See Page 7 of Applicant's disclosure), there appears to be instances where the thickness of the adhesive does not fall in the range of 1 to 30 microns, particularly if one references the contact point of the largest spacers to the opposing prism faces (at this point, the thickness of the adhesive drops to zero microns) (See 16, 24, 38 in Figure 3).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claim 37 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 37 recites the limitation that the wire grid has a height, and the adhesive thickness is less than the wire grid height. A review of Figures 1 and 3 of Applicant's disclosure reveals that the heights of the wire grid elements (See for example 28 in Figure 3) are less than the height/thickness of the adhesive layer (See for example 36 in Figure 3). Further, the specification of the disclosure is silent with regard to any particular relationship between the heights of the wire grid elements and the height/thickness of the adhesive layer. Based on the specification and drawings of the disclosure, the thickness of the adhesive is approximately the same as the diameter of the spacers, which is in a range of 1-30 microns (See Page 7, lines 1-3 of Applicant's disclosure). Since the spacers also function to provide a uniform distance from the wire grid polarizer elements to the opposing prism surface to create an air gap therebetween (See 20, 28 in Figures 1, 3; Page 5, lines 1-5 of Applicant's disclosure), the height of the wire grid polarizer elements must be less than the thickness of the adhesive. For purposes of examination, the Examiner has taken this limitation to mean 'the wire grid has a height, and the wire grid height is less than the adhesive thickness'.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2872

12. Claims 22, 30-34, 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. in view of Matsuda (U.S. Patent No. 5703861), of record.

Ito et al. discloses a polarized light beam splitter assembly (See for example Figure 16) comprising a polarized light beam splitter prism (See 10, 40 in Figure 16) including a first internal surface (See S2i in Figure 16) and a second internal surface (See S1o in Figure 16); a wire grid polarizer (See 21 in Figure 16) including a first surface secured to the prism first surface (See S2i in Figure 16) and a second surface (See surface on 210 attached to polarizer grid elements 211 in Figure 16) raised from and parallel to the polarizer first surface, with a perimeter region and a central region; an air gap cavity (See 212 in Figure 16) between the prism second surface and the polarizer second surface central region; and a wire grid attached to the polarizer second surface central region, with a height extending into the air gap cavity (See 211 in Figure 16). Ito et al. also discloses a polarized light beam splitter assembly (See Figure 16), the assembly comprising a prism (See 10, 40 in Figure 16) having a source axis oriented to accept light in a first polarization (See incident light having both polarizations in Figure 16) and an emission axis to supply light in a second polarization (See either reflected or transmitted light in Figure 16); a polarizer in a prism (See 21 in Figure 16), including a glass substrate with parallel first surface having a perimeter and second surface (See 210 in Figure 16; Paragraph 0094), and a wire grid (See 211 in Figure 16) having a height and formed overlying the glass substrate first surface; and an air gap (See 212 in Figure 16) interposed between the glass substrate first surface and the prism. Ito et al. additionally discloses the air gap cavity having an area defined by the polarizer second surface

perimeter region (See air gap 212 which is demarcated by edges of prism 10 and 40 in Figure 16); the prism is a glass cube split into interfacing first and second sections, wherein the prism first surface is formed on the prism first section interface and the prism second surface is formed on the prism second section interface (See 40, 10 in Figure 16); the cube defining an elongate axis and wherein the prism first and second surfaces have an angle, defined with respect to the elongated axis, in a range of one to eighty nine degrees (See for example line marked 'L' in Figure 16 and direction of first and second internal exposed surfaces with respect to axis 'L' in Figure 16); a light source positioned to emit light (See for example 160, 170 in Figures 7, 18); a reflection device, such as an LCD (See for example 300 in Figures 1, 8, 10); and wherein the polarizer second surface accepts light from the light source and redirects the light toward the reflection device (See Figures 1, 8, 10). Ito et al. lacks an adhesive formed between the polarizer second surface perimeter region and the prism second surface such that the air gap cavity is surrounded by the adhesive, thus embedding the wire grid polarizer. However, Matsuda teaches an apparatus utilizing an embedded wire grid polarizer (See for example Figure 8), wherein the wire grid polarizer (See 34A, 34B in Figure 8) is secured to an exposed internal surface of a substrate (See 31 in Figure 8) via a spacer or raised projection of solder adhesive (See rectangular spacers connecting 31 and 32 in Figure 8; 47B, 49B in Figure 6) so as to define a gap, which is surrounded by the solder adhesive, between a surface of the wire grid polarizer and the exposed internal surface of the beam splitter prism. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have an adhesive be formed between the polarizer

second surface perimeter region and the prism second surface such that the air gap cavity is surrounded by the adhesive, thus embedding the wire grid polarizer, as taught by Matsuda, in the assembly of Ito et al., for the purpose of providing a fixed and rigid alignment of the prism blocks and wire grid polarizer, thus reducing alignment and light scattering losses in the polarized light beam splitter assembly.

13. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. in view of Matsuda.

Ito et al. in view of Matsuda discloses the invention as set forth above in Claim 22. Matsuda further discloses the polarizer wire grid height being less than the adhesive thickness (See Figure 8); and the spacers being formed on the polarizer second surface (See Figures 6, 8-9). Ito et al. in view of Matsuda lack a height defined by the adhesive thickness. However, Matsuda further teaches that the air gap separating the embedded wire grid polarizer from the opposing substrate may be defined by the solder adhesive located in a perimeter region of the structure, the thickness of the solder adhesive dictating the size of the air gap (See in particular 34A, 34B, 47B, 49B in Figures 6; 34A, 34B, 31, rectangular spacers connecting 31 and 32 in Figure 8). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a height be defined by the adhesive thickness, as additionally taught by Matsuda, in the assembly of Ito et al. in view of Matsuda, to reduce the cost and complexity of the assembly, since fewer materials (such as conventional same-size spacers) are required to assemble and align the optical system.

14. Claims 24, 35, 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. in view of Matsuda.

Ito et al. in view of Matsuda discloses the invention as set forth above in Claims 22-23, 34, except for the adhesive having a uniform thickness defined between the polarizer second surface (glass substrate first surface perimeter) and the prism second surface (prism first interior surface). However, Matsuda further teaches that the solder adhesive located in the perimeter of the region may have a thickness to provide the air space cavity between the wire grid elements and the opposing substrate surface (See in particular 34A, 34B, 47B, 49B in Figures 6; 34A, 34B, 31, rectangular spacers connecting 31 and 32 in Figure 8). Although Matsuda does not explicitly disclose the solder adhesives being uniform in thickness, one of ordinary skill in the art would have known to utilize uniformly sized and shaped (i.e. same size and shape) solder adhesives at all of the adhesion points to produce a uniformly sized air space cavity between the wire grid elements and the opposing substrate surface. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the adhesive have a uniform thickness defined between the polarizer second surface (glass substrate first surface perimeter) and the prism second surface (prism first interior surface), as additionally taught by Matsuda, in the assembly of Ito et al. in view of Matsuda, for the purpose of reducing alignment and placement errors between the prisms and the wire grid polarizer.

15. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. in view of Matsuda.

Ito et al. in view of Matsuda discloses the invention as set forth above in Claims 22-24, except for the air gap cavity having a volume defined by the product of the adhesive thickness and the air gap cavity area. However, it is noted that one of ordinary skill in the art, given basic knowledge of geometry, would have been able to determine the volume of the air gap cavity as the difference of the product of the adhesive thickness (T_a) and the air gap cavity area (A_{ag}) and the sum of the volumes taken up by each of the projections ($V_{n,proj}$) of the wire grid polarizer elements into the air gap cavity:

$$volume = (T_a \cdot A_{ag}) - \sum_n V_{n,proj}.$$

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to the air gap cavity have a volume as defined above, to provide additional data and information which may be utilized to further optimize the fabrication, operation and function of the assembly.

16. Claims 26, 27, 29, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. in view of Matsuda as applied to Claims 22-25, 34-35 above, and further in view of Yamada et al. (U.S. Patent No. 6013339), of record, and Ishiwatari (JP 11007027 A).

Ito et al. in view of Matsuda discloses the invention as set forth above in Claims 22-25, 34-35, except for the spacers being spherical shaped with a diameter and having a uniform size embedded in the adhesive, the adhesive thickness being equal to the spaced diameter. However, Yamada et al. teaches that spacers may be used in the periphery of the device to attach the substrates together and to form the internal gap, and that the spacers may be in the form of rigid glass beads, all of uniform diameters to provide a gap of uniform thickness (See 2 in Figure 5; col. 10, lines 54-64). Further, Ishiwatari teaches

Art Unit: 2872

that such uniformly sized spacer beads may be embedded in the adhesive (See Abstract; Figures 1-2), such that air space cavity is the diameter of the spacer beads. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the spacers be spherical shaped with a diameter and having a uniform size embedded in the adhesive, the adhesive thickness being equal to the spaced diameter, as taught by Yamada et al. and Ishiwatari, in the polarized light beam splitter assembly of Ito et al. in view of Matsuda, for the purpose of sealing and protecting the wire grid polarizer, as well as provide a uniform thickness spacing between the wire grid polarizer and the exposed internal surface of the beam splitter prism.

17. Claims 28, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. in view of Matsuda, and further in view of Yamada et al. and Ishiwatari.

Ito et al. in view of Matsuda, and further in view of Yamada et al. and Ishiwatari discloses the invention as set forth above in Claims 22-26, 34-35, except for the adhesive thickness being in the range of one to thirty μm . It would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the adhesive thickness to be in the range of one to thirty μm , since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One would have been motivated to have the adhesive thickness have a width in the range of one to thirty μm for the purpose of reducing fabrication costs (since larger air gap widths require a spacer with an appropriately larger thickness or diameter) while providing a controlled air gap spacing.

Art Unit: 2872

In re Aller, 220 F.2d 618, 195 USPQ 6 (CCPA 1977). See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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3/17/05